Complex Analysis, MS-C1300, Period II, Autumn 2020

Webpage of the course

https://mycourses.aalto.fi/course/view.php?id=29625

Learning outcomes

After passing the course the student will
- be able to make use of complex numbers in solving geometric problems
- be able to solve mapping problems in the plane
- recognize behavior of complex functions
- be able to interpret basic properties of analytic functions
- be able calculate real integrals by making use of complex integrals

Content

The interpretation and use of complex numbers, analytic function, conformality, harmonic function, basic complex functions, line integrals, sequences and series, Cauchy formula and its consequences.

Course book

- *An Introduction to Complex Function Theory,* Bruce Palka, Undergraduate Texts in Mathematics, Springer, 1991

An alternative that is excellent but a little more challenging:

- *Complex Analysis,* Lars Ahlfors, McGraw-Hill, 1979

Teaching

All lectures will be given online. I will record videos of the lectures and during the scheduled times for lectures (Mondays 12 - 14 and Thursdays 10 - 12) we will have Zoom meetings where we look at the recordings and have discussions. The exercise classes will be held (if the Corona situation doesn't force us to change plan) either via regular exercise classes on campus or online meetings. The groups H01 and H02 will meet on campus. The group H03 will have online meetings.

Examination

There will be a course exam on December 7th 09.00 - 12.00

During the course there will be hand-in exercises to solve. Each week we have 2 exercise sessions. Group H01 meets on Tuesdays and Thursdays. Group H02 meets on Wednesdays and Fridays. Group H03 meets online on Wednesdays and Fridays. Before each meeting (but not the first group meeting) you will get 2 exercises to solve that you hand in for grading. Deadlines will be Mondays (for the Tuesday/Wednesday meetings) and Wednesdays (for the Thursday/Friday meetings) at 23.59. The assistants will present solutions to these problems (and other problems) during the following group session. The points you collect in this way will give you bonus points on the course exam (6 bonus points is the maximum). When you take the course exam these bonus points will be added to your result (maximum 24 points).

Lecturer and assistants

My name is Björn Ivarsson and I am the lecturer for the course. My office is Y326 and you are welcome there with any question concerning the course that you might have. You can also e-mail me (bjorn.ivarsson@aalto.fi). The assistants are David Adame Carillo, Teemu Tasanen and Tiina Vesanen. They will be running the group meetings.

Tentative plan for lectures

- Lecture 1 The Complex Number System (Chapter 1 in the book)
- Lecture 2 Rudiments of Plane Topology (Chapter 2)
- Lectures 3 - 4 Analytic Functions (Chapter 3)
- Lectures 5 Complex Integration (Chapter 4)
- Lectures 6 - 8 Cauchy's Theorem and its Consequences (Chapter 5)
- Lectures 9 - 10 Sequences and Series of Analytic Functions (Chapter 7)
- Lectures 11 - 12 Isolated Singularities of Analytic Functions (Chapter 8)